and to the young people of our State and the respect he has of his rank and file for these men and women to go beyond their regular duties and responsibilities and step up and say: There is an epidemic in America. Our dropout rate is too high. What can the National Guard do, in addition to everything else they do both abroad and at home, to help? It is extraordinary.

His grandchildren and his children are proud of him. I know he is very proud of them.

He has assembled over the last 14 years arguably the most tested staff in the Nation. He is being succeeded as Adjutant General by GEN Glenn Curtis, who has served as General Landreneau's right-hand man for the last 6 years. It is the hallmark of his leadership that General Landreneau leaves his staff ready to step up, ready to serve, and ready to continue the excellent service they have given to the people of our State and our Nation. Although General Curtis will bring his own brand of leadership to the National Guard, there is no doubt, as he has said to me many times, he has learned at the elbow of GEN Benny Landreneau.

In conclusion, I would like to personally, on behalf of the people of our State, thank GEN Benny Landreneau for his many years of service and dedication to the people of Louisiana and our country. I want him to know he has positively impacted our State in ways that will long be remembered. The people of Louisiana are grateful for his service and for his dedication, and we honor his admirable career in the National Guard.

Thank you, Mr. President. I yield the floor and suggest the absence of a quorum.

The PRESIDING OFFICER. The clerk will call the roll.

The assistant bill clerk proceeded to call the roll.

Mr. FRANKEN. Mr. President, I ask unanimous consent that the order for the quorum call be rescinded.

The PRESIDING OFFICER (Mr. BEGICH). Without objection, it is so ordered.

Mr. FRANKEN. Mr. President, I ask unanimous consent that Senator WHITEHOUSE and I be permitted to engage in a colloquy.

The PRESIDING OFFICER. Without objection, it is so ordered.

CLIMATE CHANGE

Mr. FRANKEN. Mr. President, I rise today to address an alarming trend that I see in our national discourse. As legislators, our decisions need to be rooted in facts. Science driven by data and rigorous analysis needs to inform our policymaking.

Scientists are the ones who made the United States the world's innovator in the last century. Scientists are the people who gave us antibiotics, for example. Do you like being able to use antibiotics? Well, then, thank scientists.

Scientists put a man on the Moon—several men, actually—and got him back safely. These are rocket scientists.

Scientists made it possible for Americans to watch this speech on C–SPAN—that is C–SPAN, the Cable Satellite Public Affairs Network—also rocket scientists.

Scientists also came up with such useful things as the Internet.

A scientist from the University of Minnesota, a Noble Price-winning agronomist named Norman Borlaug, is credited with saving over 1 billion lives worldwide. He did this by using science to develop a high-yield, disease-resistant wheat that was planted in Pakistan, India, and elsewhere around the world.

By engineering our next-generation weapons systems, scientists ensure that our military will continue to be the most powerful in the world.

We rely on science and scientists, and if we are to progress as a country, if we and future generations of Americans are to be healthy and prosperous and safe, we better put science right at the center of our decisionmaking. Yet, right now, foundations and think tanks funded by the fossil fuel industry are spreading misinformation about the integrity of climate science, much as think tanks paid by the tobacco industry used misinformation to cast doubt about the health hazards of smoking.

Ignoring or flatout contradicting what climate scientists are telling us about the warming climate and the warming planet can lead to really bad decisions on natural energy and environmental policies here in Congress. So today Senator WHITEHOUSE and I want to take some time to talk about climate science and about the fact that a scientific consensus on climate change has been reached. Climate change is happening and is being driven by human activities.

From the National Academy of Sciences, to the American Meteorological Society, to the American Academy for the Advancement of Science, all of the preeminent scientific institutions agree that manmade greenhouse gas emissions are warming the planet and are a threat to our economy, to our security, and to our health, and so do the overwhelming majority of actively publishing climatologists.

This graph, taken from a study published by the National Academy of Sciences, shows responses to the survey question: Do you think human activity is a significant contributing factor in changing mean global temperatures?

What you see here is that as climate expertise goes up, so does the affirmation that climate change is real and is caused by human beings. Among the most expert pool of respondents, climatologists who are actively publishing on climate change, represented by this bar right here, the rightmost bar, 97 percent of that category of scientists answered yes. Of course, there are a few articles published by climate skeptics in peer-reviewed journals, but the vast majority—97 percent—of the peer-reviewed literature supports the notion that people are causing the Earth's climate to change.

What are peer-reviewed articles? Well, they are articles scientists write after conducting experiments. The experimentation is designed to test a hypothesis. If the hypothesis holds up, the scientist writes a paper describing the experiment and sends to it a professional journal. The journal then sends to it other experts in the field—peer reviewers—who see if they can tear any holes in the theory. They question the methodology. They check the math. Very often, they send the paper back with questions. And the researchers will make changes to satisfy the reviewers' inquires. If in the end the peer reviewers think the work is sound, they recommend the paper for publication. Then, after publication, other scientists in the field are free to read the paper and plug away and disprove it if they can. That is a peer-reviewed paper.

I repeat, the vast majority of peer-reviewed literature supports the notion that people are causing the Earth's climate to change, and 97 percent of published climatologists say yes when asked: Do you think human activity is a significant contributing factor in changing mean global temperatures?

Mr. WHITEHOUSE. Mr. President, as Senator FRANKEN has pointed out, despite the efforts to mislead and create doubt, the jury is not out on whether climate change is happening and being caused by manmade carbon pollution; the verdict is, in fact, in, and the verdict is clear, as shown by this group of scientific organizations that signed a letter supporting our efforts to do something about carbon pollution in the Senate back in October of 2009: the American Association for the Advancement of Science, the American Chemical Society, the Geophysical Union, the Meteorological Society, the Natural Science Collections Alliance, the Botanical Society of America.

Virtually every significant scientific organization accepts that these are the facts and that the verdict is in, and, indeed, there is some recent added support. The scientific community continues to examine this question.

A recent report by James Hansen and Makiko Sato says:

> Climate change is likely to be the predominant scientific, economic, political and moral issue of the 21st century. The fate of humanity and nature may depend upon early recognition and understanding of human-made effects on Earth's climate.

They continue:

> Earth is poised to experience strong amplifying polar feedbacks in response to moderate global warming. Thus, goals of limiting human-made warming to 2 degrees Celsius are not sufficient—they are prescriptions for disaster.

Another recent report, ''Climate Change and European Marine Ecosystem Research,'' reads as follows:

There is no doubt that rapid global warming and ocean acidification are real, and very high confidence that both are forced by human activities and emissions of carbon dioxide. Climate change effects are especially evident in the oceans.

I will get into that later on in our colloquy a little bit further.

Levels of atmospheric CO_2 are accelerating.

A third report, ''The World Energy Outlook for 2011,'' says:

Global energy-related carbon dioxide emissions reached 30.4 Gt in 2010, 5.3% above 2009, representing almost unprecedented annual growth. In the New Policies Scenario, our central scenario, CO_2 emissions continue to increase, reaching 36.4 Gt in 2035, and leading to an emissions trajectory consistent with a long-term global temperature increase of 3.5 degrees Centigrade.

What does that mean?

The expected warming of more than 3.5 degrees Centigrade in the New Policies Scenario would have severe consequences: a sea level rise of up to 2 metres, causing dislocation of human settlements and changes to rainfall patterns, drought, flood, and heatwave incidence that would severely affect food production, human disease and mortality.

There are also iconic American companies that have made the considered business judgment that climate change is real and we need to prepare. But we can get more on that later in the colloquy.

Mr. FRANKEN. Yet, in spite of all of this—and these are all new reports on top of this 97 percent number that was established. Yet the conservative media and some of my colleagues in Congress seem to think it is just fine to ignore what these scientists are saying.

Let me illustrate this with an analogy. Say you went to a doctor and the doctor told you: You better start eating more sensibly and start exercising, because you are tremendously overweight. I see that you have a family history of heart disease, and your father died of a heart attack at an early age. You have to go on a diet and start working out a little bit.

You say: You know what. I want a second opinion. So you go to a second doctor and he says: OK, you have a family history of heart disease. Your father died of a heart attack at a young age, and you weigh over 300 pounds. You smoke three packs a day. Your cholesterol is out of control, your blood pressure is through the roof. It would be irresponsible of me as a doctor not to immediately send you to this place at the Mayo Clinic that I know. I think you have to go there.

You say: Thanks, doctor, but I want a third opinion. So you go to the third doctor and the third doctor reads the chart and looks at you and goes: Wow, I am amazed that you are still alive.

You say: You know what. I want a fourth opinion. And then you go to the fourth, fifth, sixth, and seventh doctors. They are all saying the same thing. But you keep asking for more opinions.

Finally, you go to the 25th doctor. The 25th doctor says: It is a good thing you came to me, because all this diet and exercise would have been a complete waste. You are doing fine. Those other doctors are in the pockets of the fresh fruit and vegetable people. He says: Enjoy life, eat whatever you want, keep smoking, and watch a lot of TV. That is my advice.

Then you learn the doctor was paid a salary by the makers of Twinkies, which, don't get me wrong, are a delicious snack food and should be eaten in moderation. Am I making sense here?

Mr. WHITEHOUSE. It is actually quite a good example, because we have some of the phony science that has attacked the science of climate change, which is actually a pretty good comparison to what the Senator described.

Take, for instance, the bogus Marshall Institute, which was founded in 1984 by a physicist who had been the chief scientist behind the tobacco industry's campaign to convince Americans that tobacco is actually OK for you, and that there was doubt about whether it would actually do you any harm. A few years later, he organized something called the Oregon Petition, which denied that climate change was happening. They phonied up the Oregon Petition to look like official papers of the National Academy of Sciences. So the National Academy of Sciences had to take the unusual step of responding that the petition ''does not reflect the conclusion of expert reports of the academy,'' and further, that it was ''a deliberate attempt to mislead.'' So he is an ''expert'' saying that tobacco is OK for you. Suddenly, he turns up as a climate denier, and he phonies up his report to look like——

Mr. FRANKEN. Was he part of a foundation?

Mr. WHITEHOUSE. This is founded by the Marshall Institute. There are others of these out there. The other example is the Heartland Institute, another so-called think tank with backers from tobacco and the fossil fuel industries, founded also in 1984. It has written reports to try to manufacture doubt about climate science and about the risks of secondhand smoke. Heartland received nearly $700,000 from ExxonMobil through 2006. Their bogus policy documents include false claims that climate change is poorly understood, and simply wrong assertions, that there is no consensus about the causes, effects, or future rate of global warming.

Picking these two—but there are others in the constellation of bogus science—they are commonly funded by the Bradley Foundation, the folks who brought you the John Birch Society; by the Scaife foundations, which are constantly behind rightwing causes; the Olan Foundation, which is against public health causes; ExxonMobil; and by the Koch brothers. Although it may look like different voices, it is actually the same money speaking through different fronts.

Mr. FRANKEN. This is actually an interesting area. There is a well-established link between the scientists who have worked for think tanks such as George C. Marshall Institute, Heartland Institute, and other foundations, which were funded at first by tobacco money and, since then, by the fossil fuel industry. These scientists have been paid to spread misinformation in order to cast doubt. That is all they have to do—on a whole host of scientific issues—first, tobacco and acid rain, the hole in the ozone layer, and now climate change.

Take tobacco, for example. Scientists were paid to testify in court that there was no proof that smoking caused cancer or was addictive, even after the industry scientists knew darn well that cigarettes were addictive and did cause cancer and heart disease. In fact, the tobacco industry was found guilty in 2004 of plotting to conceal the health risks and addictiveness of cigarettes from the public. The judge found that the tobacco industry had ''devised and executed a scheme to defraud consumers and potential consumers about the hazards of cigarettes—hazards that their own internal company documents proved they had known since the 1950s.''

The whole purpose of this scheme was to provide misinformation, to confuse the public, to manufacture doubt, and that is what is happening right now with climate change. Public data from the Security and Exchange Commission and from charitable organization reports to the IRS report showed that between 2005 and 2008, ExxonMobil gave about $9 million to groups linked to climate change denial, while foundations associated with the private oil company Koch Industries gave nearly $25 million. The third major funder was the American Petroleum Institute. All in all, the energy industry spent hundreds of millions of dollars, even billions of dollars, on lobbying against climate change legislation between 1999 and 2010, including a large spike in spending from 2008 to 2010.

Mr. WHITEHOUSE. And it is not enough that they have a stable of paid-for scientists to create doubt, to create phony science that raises the level of doubt; they also go out of their way to attack legitimate scientists. You would not think this would carry much weight in a proper debate, but amplified by the corporate money behind it, and designed, as the Senator said, with the purpose not to win the argument but to create doubt so that the public moves on, it is actually worse.

One example of this attack on lifetime scientists has been the phony so-called Climategate scandal, which was an effort to derail international climate science and climate negotiations.

Mr. FRANKEN. Climategate. Sometimes the Senator and I refer to it as ''Climategate-gate.''

Mr. WHITEHOUSE. Yes, Climategate-gate. In fact, the real scandal here wasn't what the scientists did; the real

scandal was the phony attack on the scientists.

Mr. FRANKEN. I thank my colleague for bringing this up. Let's talk about that. This is the leak of thousands of e-mails from scientists at the University of East Anglia Climate Research Unit back in 2009. It was done right before the Copenhagen conference, right?

Mr. WHITEHOUSE. I believe that is correct.

Mr. FRANKEN. OK. The conservative media—remember, this doubt is amplified in the conservative echo chamber, talk radio, et cetera. You know what it is, the Wall Street Journal editorial page, Fox News, et cetera. Conservative media pounced, taking quotes out of context to sensational lies like this ''scandal.'' Most of the attacks were directed at an e-mail by Phil Jones, a climate scientist working with the East Anglia Climate Research Unit, in which in this e-mail he referred to using ''Mike's Nature trick of adding in the real temps to each series for the last 20 years to hide the decline.'' That sounds very bad, ''trick'' and ''hide the decline.'' That went viral in the conservative media—evidence that the scientific consensus on climate change was a giant hoax. We had a Member of this body who said the science behind this consensus ''is the same science that, through climategate, has been totally rebuffed and no longer legitimate, either in reality or in the eyes of the American people and the people around the world.''

But it turns out that the trick being referred to in the e-mail is actually a technique to use the most accurate data available. Pre-1960, temperature data would include measurements from thermometers, tree rings, and other so-called temperature proxies. Post-1960—this is the trick—they excluded tree ring data from some specific kinds of trees that were widely recognized by the scientific community to be unreliable after 1960. So the decline refers—they refer to it as—it isn't a decline in global temperatures, as the deniers claim.

Since 1960, we have had pretty good measurement of temperatures around the world with things such as thermometers. They knew this tree ring gave an apparent decline in temperature, as measured by these specific kinds of trees that were known to be inaccurate compared to all the sensors we have for measuring—and there are thousands and thousands and thousands and thousands and thousands of measurements of the temperature around the Earth every minute, every day.

So this was the ''trick''—a technique to use the most accurate data available of global temperatures from things, again, called thermometers, and one that excluded data widely known to the scientific community to be inaccurate. That is what the ''trick'' was. That is all. That is what Phil Jones referred to in his e-mail. Ironically, he was trying to be precise.

Mr. WHITEHOUSE. And it provoked considerable review afterward because of the alarmist claims that were made in this phony attack on the climate science. A number of pretty respectable organizations took a look at this. One was the university itself, and the university itself reached the conclusion on the specific allegations made against the behavior of CRU scientists, ''We find that their rigor and honesty as scientists are not in doubt. In addition, we do not find that their behavior has prejudiced the balance of advice given the policymakers. In particular, we did not find any evidence of behavior that might undermine the conclusions of the IPCC assessment.'' That was the university review.

Not enough? The National Science Foundation also——

Mr. FRANKEN. The university could be biased.

Mr. WHITEHOUSE. That is why we go on to the National Science Foundation, which found no direct evidence of research misconduct and therefore said, ''We are closing this investigation with no further action.''

Parliament looked into it as well, because the university was in Great Britain. And the House of Commons did an investigation. The Commons' investigation concluded that the challenged actions by Professor Jones and others ''were in line with common practice in the climate science community.'' They went on to say:

Insofar as we have been able to consider accusations of dishonesty, we consider that there is no case to answer.

No case to answer. Finally, they said:

We have found no reason in this unfortunate episode to challenge the scientific consensus as expressed by Professor Bennington that ''global warming is happening and that it is induced by human activity.''

So the studies that looked at whether the climate science was phony or whether the climategate scandal was phony have all come down supporting the science and pointing out that climategate should properly be known as climategate-gate because it was the scandal that was phony.

Mr. FRANKEN. Now, let's make a distinction between people who are climate skeptics and people who are climate deniers. This is kind of an important distinction. There is nothing wrong with skepticism. In fact, we love skeptics. Scientists are, by nature, skeptical. If someone has a new idea, they need to prove conclusively they are right before 97 percent of scientists will believe them. This has already happened for an overwhelming majority of climate scientists who have concluded, again, that global warming is happening and that it is caused by mankind. But there are a small number of them who still have questions.

On the other hand, a climate denier is someone who would not be convinced no matter how overwhelming the evidence. And, as I pointed out, a lot of these deniers are being paid by polluters to say what they want.

Now, shortly after climategate, or climategate-gate, a physicist at the University of California Berkeley, Richard Muller, who was skeptical of the prevailing views on climate science, decided to test the temperature records. Muller, a skeptic, started the Berkeley Earth Surface Temperature Study to reevaluate the record and weed out scientific biases. This was gold to climate deniers. In fact, among the funders for the Muller study was the Charles Koch Foundation. But things didn't work out the way the deniers had hoped.

In late March, Dr. Muller testified before the House Science and Technology Committee with his initial findings on temperature increases since the late 1950s. This is what he said:

Our result is very similar to that reported by the prior groups—a rise of about .7 degrees Celsius since 1957. This agreement with the prior analysis surprised us.

Because, as I say, they were skeptics. Muller basically recreated the blade of the so-called hockey stick graph, or the temperature graph, that had come under attack in climategate.

This graph shows Muller's estimates against the previous estimates. Muller's Berkeley is black. You will see it is just identical, pretty much. This past October Dr. Muller's group released its findings, and to the dismay of skeptics and deniers these findings further confirmed the prevailing science behind climate change and the work of the scientists attacked during climategate-gate.

We can see the results on the chart. This gray band indicates a 95-percent statistical spacial uncertainty. But it is exactly—and his line is the black line—exactly what the other scientists measured.

The summary of the findings begins by saying, bluntly, ''global warming is real,'' and goes on to say:

Our biggest surprise was that the new results agreed so closely with the warming values published previously by other teams in the U.S. and U.K.

Including East Anglia.

This confirms these studies were done carefully and that potential biases identified by climate change skeptics did not seriously affect their conclusion.

So even though these claims that the consensus on global warming is a hoax have been refuted so convincingly—by a skeptic no less; funded by Charles Koch, no less—some of the deniers keep repeating it. The science is settled and climategate, or climategate-gate, was just a big distraction. So now let's move on and figure out how we are going to attack the challenge of climate change.

Mr. WHITEHOUSE. The challenge of climate change being extremely real, one of the things that is so frustrating about this campaign of phony, manufactured doubt is that in real life we are seeing the predictions of climate science come true around us.

Climate scientists predicted the atmosphere would warm, and the atmosphere is warming. Climate scientists

predicted the ocean would absorb heat, and sure enough, the ocean has absorbed heat and ocean waters are warming. Climate scientists predicted the ocean would absorb CO_2 and that would then lower the pH level of our ocean waters. The ocean is now more acidic than it has been in 2 million years, threatening coral reefs, shellfish, and the tiny creatures, such as plankton, that make up the base of the entire oceanic food chain.

Climate scientists predicted glaciers and Arctic sea ice would melt and, sure enough, we are seeing record melting. We just saw that notorious leftwing publication, USA Today, report:

Federal Report Arctic Much Worse Since 2006. Federal officials say the Arctic region has changed dramatically in the past 5 years for the worse. It is melting at a near record pace and it is darkening and absorbing too much of the sun's heat.

Climate scientists predicted ecosystem shifts, and we are seeing ecosystem shifts, such as the million-plus-acre forests in the American West—dead to the bark beetle, gone from being green and healthy forests to just mile after mile of brown and dead trees.

Mr. FRANKEN. Explain why the bark beetle is doing this. What is happening and how does that relates to climate change?

Mr. WHITEHOUSE. The bark beetle relates to climate change because what was keeping those trees free from the bark beetle was cold winters that killed off the bark beetle larvae. As temperatures have warmed, the larvae lived through the winters, and they attacked the trees. So trees that were protected by cold winters are no longer protected, and there are literally millions of acres of forest lost in the West.

On a smaller scale, but more important to me in my home State of Rhode Island, the preeminent fish that was taken out of Narragansett Bay was called the winter flounder. My wife wrote her Ph.D. thesis about the winter flounder. It was a very significant cash crop for our fishermen and is now virtually gone because the mean water temperature of Narragansett Bay is up nearly 4 degrees.

Scientists also predicted we would be loading the dice for extreme weather with climate change, and we are seeing an unusual amount of extreme weather. The number of billion-dollar disasters has hit a record. A recent press clip noted:

With an almost biblical onslaught of twisters, floods, snow, drought, heat, and wildfire, the U.S., in 2011, has seen more weather catastrophes that caused at least $1 billion in damage than it did in all of the 1980s, even after the dollar figures from back then are adjusted for inflation.

Serious, grown-up corporate entities, like the biggest insurance companies in the world, are noticing this and are concerned. Munich Reinsurance has written the following:

The high number of weather-related natural catastrophes and record temperatures, both globally and in different regions of the world, provide further indications of advancing climate change.

Throughout the corporate world we are seeing this. Here is a list of companies that have gone public with the need for us to do something about climate change: American Electric, Bank of America, Chrysler, Cysco, DuPont, Duke Energy, eBay, Toyota, Timberland, Starbucks, Google, GM, General Electric, Ford, Siemens, PepsiCo, Nike, Nishiland, and John Deere. I am picking these at random, but these are not fringe organizations. These are the core of the American business community, and they recognize what is going on.

I want to single out one company, which is Coca-Cola. I was going to bring to the floor the new can of Coca-Cola as an exhibit to demonstrate this major international corporation—this huge American success story based in Atlanta—has taken probably the most iconic product in America—the Coke can—and has redesigned it to reflect what the climate change is doing in the Arctic and to polar bears. Unfortunately, my Coke can was confiscated by the cloakroom staff because I am not allowed to bring exhibits to the floor unless they are this. I should have snuck it out here, but that is why I don't have it.

Coca-Cola is a serious American business, and here is what they say:

The consensus on climate science is increasingly unequivocal—global climate change is happening and man-made greenhouse gas emissions are a crucial factor. The implications of climate change for our planet are profound and wide-ranging, with expected impacts on biodiversity, water resources, public health, and agriculture.

So we put against that the core business community—iconic companies such as Coca-Cola, putting their very label behind the need to address climate change—and the phony-baloney-paid-for scientists who are creating this doubt, and it is time to close this episode.

Mr. FRANKEN. I am glad the Senator brings up the phony-baloney doubt, especially with this extreme weather we have been experiencing. Some of my colleagues on the other side have pointed to the extreme snowstorms—at least one of my colleagues has—in the Northeast over the last several winters as evidence that global warming is a hoax. Again, this is completely misleading. Intensifying blizzards aren't due to the Earth getting cooler, they are due to increased moisture content in the air. Warmer air holds more moisture.

Now, basically, it doesn't have to be that cold for it to snow. It just has to be 32 degrees or below. What is snow? It is frozen water. So it is about water. The atmosphere is now holding more water because it is warmer. Warmer air holds more water than colder air. The main point is that these increased natural disasters have real costs.

A few months ago we had a hearing in the Energy and Natural Resources Committee on the Forest Service's management of the intense forest fires we had out West this year. In that hearing, Forest Service Chief Tom Tidwell told me he is seeing longer forest fire seasons out West—more than 30 days longer than what we used to have even a decade ago. Forest Service climate experts—and these are scientists—have said that a major contributing factor to these longer fire seasons and more intense fires is climate change.

The cost of these fires, passed on to all levels of government and to society as a whole, is huge. It is something that Members on both sides of the aisle recognize and are concerned about. Several of my Republican colleagues in that hearing expressed their concerns about the cost.

They referred to a report from the Western Forestry Leadership Coalition, which estimates that the combined direct and indirect costs of forest fires can be as much as 30 times the cost of fire suppression alone. We need to factor in the cost of forest rehabilitation, the loss of tax revenues for local governments, loss of businesses that depend on forest resources from property losses, not to mention the immeasurable cost of lives which are lost due to the fires.

I wish to underscore for Members of this body that when we have discussions about important issues such as cost of wildfire response, we are talking about the cost of responding to climate change. If forestry specialists at the U.S. Forest Service tell us these fires are getting worse due to climate change, we should be listening to them.

Mr. WHITEHOUSE. If the Senator doesn't mind, if I change elements from fire to water since I represent an ocean State, another place where climate change is creating dangerous consequences is in our oceans. Let me cite a few reports that have come out recently.

Climate Change & European Marine Ecosystem Research says:

Close to one-third of the carbon dioxide produced by humans from burning fossil fuels and other sources has been absorbed by the oceans since the beginning of industrialization, and that has buffered the cause and effects of climate change.

A resulting lowered pH—

When carbon goes into the ocean, it acidifies it. It lowers the pH.

A resulting lowered pH and saturation states of the carbonate minerals that form the shells and body structures of many marine organisms makes these groups especially vulnerable. The growth of individual coral skeletons and the ability of reefs to remain structurally viable are likely to be severely affected. Continuing acidification may also affect the ability of the oceans to take up CO_2.

So they will not be absorbing the one-third that they have absorbed any longer. It will stay in the atmosphere and atmospheric concentrations will increase even faster.

The Annual Review of Marine Science reports that:

Growing human pressures, including climate change, are having profound and diverse consequences for marine ecosystems. These effects are globally pervasive and irreversible on ecological time scales. Direct consequences include increasing ocean temperature and acidity, rising sea level, increased ocean stratification, decreased sea ice, and altered patterns of ocean circulation, precipitation, and fresh water.

The context for this is a pretty astounding one; that is, when we look back through history, we don't look at changes in terms of decades or even generations. We look at changes in terms of millions of years.

There is a special issue of Oceanography with a feature on ocean acidification, and it is called ''Ocean Acidification in Deep Time.''

We have now an atmosphere that already contains more carbon dioxide than at any time in the last 800,000 years of earth history and probably more than has occurred in several tens of millions of years.

We have had agriculture as humans for about 10,000 years, to give you an idea of what 800,000 years or several tens of millions of years means. The report goes on:

There are no precedents in recent earth history for what will be the immediate and direct consequences of the release of CO_2 into the atmosphere and its concurrent dissolution in the ocean's waters.

But we are playing with very dangerous effects when we ignore climate change at the behest of a tiny minority of scientists and their polluter industry funders behind them.

Mr. FRANKEN. There are folks who get the cost of inaction, and that includes the Department of Defense.

In its 2010 Quadrennial Defense Review—or QDR—the DOD identified climate and energy as among the major national security challenges that America faces now and in the future.

To give you a perspective on the significance of this, ''Crafting a Strategic Approach to Climate and Energy'' was alongside other priorities laid out in the QDR with titles like, ''Succeed in Counterinsurgency, Stability and Counterterrorism Operations,'' and ''Prevent Proliferation of Weapons of Mass Destruction.''

This is serious stuff. It matters for DOD because climate change is predicted to increase food and water scarcity, increase the spread of disease, and spur mass migration and environmental refugees due to more intense storms, floods, and droughts.

Mr. WHITEHOUSE. We had similar testimony in the Senate Intelligence Committee. The witness who testified before us released his testimony before the House Intelligence Committee and very much the same conclusion:

We judge that global climate change will have wide-ranging implications for U.S. national security interests over the next 20 years.

The factors that would affect U.S. national security interests as a result of climate change would include food and water shortages, increased health problems, including the spread of disease, increased potential for conflict, ground subsidence—the Earth lowering—flooding, coastal erosion, extreme weather events, increases in the severity of storms in the Gulf of Mexico, disruptions in U.S. and Arctic infrastructure, and increases in immigration from resource-scarce regions of the world.

There are probably climate deniers who say: That is all part of the conspiracy. The Defense Department is in on it. All those companies are in on it. The intelligence community is in on it.

But if there is a hoax, what is more mainstream than National Geographic? Is National Geographic in on it too? They would have to be because they did a special report a few years ago on climate change and they showed a polar bear stranded on the melting ice. Here is what they said:

It's here. Melting glaciers, heat waves, rising seas, trees flowering earlier, lakes freezing later, migratory birds delaying their flight south. The unmistakable signs of climate change are everywhere.

How do we know this? We know this because of the science. What do they say about the science?

How do we know our climate is changing? Historical records, decades of careful observations and precise measurements—

As the Senator said, with things such as thermometers—

around the globe along with basic scientific principles.

If you think National Geographic is in on it and you can't have faith in the Defense establishment and you can't have faith in the corporate establishment and you can't have faith even in National Geographic, perhaps you can have faith in the Pope, who said recently:

I hope that all members of the international community can agree on a responsible, credible, and supportive response to this worrisome and complex phenomenon, keeping in mind the needs of the poorest populations and of future generations.

The press release from Catholic News Service then quotes one of his bishops, Cardinal Rodriguez, who says:

Our climate is changing. Urgent action is necessary.

He called on our political leaders around the world ''to curb the threat of climate change and set the world on a path to a more just and sustainable future.''

Mr. FRANKEN. OK. Well, the Pope—I mean, didn't the Catholic Church go after Galileo?

Look, between the science supporting climate change and the reality of the dangers that climate change brings, we have to ramp up our efforts to master this challenge, and that means wise investments in clean energy R&D and deployment. They are just a good place to start. Plus, these investments encourage the growth of domestic clean energy—a domestic clean energy economy which would create jobs—and has created jobs—grow our manufacturing base, and keep us competitive in global energy markets. That is so important because Germany, China, Denmark, and countries all over the world are winning this race.

One of the great parts about this job is spending half the time here and half the time home in Minnesota. Minnesota is a national leader in clean energy.

In 2007, Minnesota passed the highest renewable energy standard in the country at the time, and all our utilities are on track to meet the goal of 25 percent renewable by 2025.

Our largest utility, Xcel Energy, is on its way to 30 percent by 2020. We have universities such as the University of Minnesota Morris which is pushing the frontiers of innovation in greening its campus through a biomass gasification system which provides heating and cooling and electricity, wind turbines that produce power, and LEED-certified buildings. Our farmers have led the country in biofuels, and our universities are leading R&D efforts for the transitions to cellulosic and other advanced biofuels.

By the way, the first commercial cellulosic plant that is scaled up to commercial levels is being built right now. St. Paul has the largest district energy system in North America. It is heating and cooling all of downtown St. Paul with woody biomass. SAGE Electrochromics is a manufacturing plant in Minnesota that has cutting-edge window glass technology that uses a little photovoltaic cell to control and turn these—these windows turn completely opaque and block out all UV during the summer. During the winter, they are these beautiful, huge windows that let in all the light. It isn't like a Polaroid. It is an incredible technology.

The University of Minnesota has just received two grants from the Advanced Research Projects Agency at the Department of Energy, ARPA-E, that was patterned after DARPA, the Defense Advanced Research Projects Agency that created the Internet. Across the State, businesses and cities are working together to make our buildings more energy efficient, using Minnesota-made technologies such as Marvin and Anderson windows. Minnesota, by the way, is the Silicon Valley of windows. We have 3M window films or McQuay heating and air-conditioning systems.

Just last month, I partnered with our cities and counties to launch the Back to Work Minnesota Initiative, aiming to break down barriers in financing retrofits, retrofitting public and commercial buildings across Minnesota. What is great about that, this pays for itself. You finance this and you retrofit a building; it puts people in the building trades to work who are in a depression, and it puts manufacturers that build energy-efficient materials and equipment, geothermal furnace systems and furnaces, heat exchange furnaces, pumps, and you save energy.

The energy efficiency pays for the retrofit in 4 or 5 years and you can capitalize this and we are finding innovative ways to do that. It pays for itself and you lower our carbon footprint. You use less energy, create jobs, save money. It is win-win-win-win. This is something we have to do. It is insane not to.

Mr. WHITEHOUSE. We are proud of what is going on in Rhode Island as well. We plan to meet 16 percent of our energy needs through renewable energy sources by 2020, and that is on top of a goal to cut energy use by 10 percent. So we will cut energy use by 10 percent and, of the remaining 90, get 16 percent of that out of renewable energy sources. Everybody is getting involved—utilities, towns, the State, the private sector. One of our cities, East Providence, is right now converting a brownfield which has been vacant for 40 years, nearly, into New England's largest solar institution. As my colleague says, there will be a payback and they will earn money on that for their taxpayers.

Our State of Rhode Island has been the national leader at how you map and prepare for offshore wind development. In the State and Federal waters off the coast of Rhode Island we are positioned to lead the country in offshore wind siting, with all the jobs that building those giant wind turbines and assembling them and erecting them offshore creates.

We have exciting companies such as BioProcess Algae, of Portsmouth, RI, which opened a spectacular facility in Iowa, which takes the exhaust from ethanol plants and runs it through algae farms and creates biofuels. They are at the cutting edge of that technology.

When you see these great technologies and these great opportunities—in this colloquy, we are ending on what I hope is a very strong, positive note for the economy. If we can pull away from the lies and the phony science and the polluter-paid nonsense that has so far distracted us from doing our duty as a nation, we can get into the race that is going on in this world for the energy future. The economy of this century is going to be driven by the $6 trillion clean energy industry. We do not want to fall out the back of that race and leave it to the Chinese and the Europeans. We want to be winning that race and the jobs and the economic success that can bring that not only can power our homes and our factories, it can power our economy back to security for all Americans.

I thank Senator FRANKEN for inviting me to join him in this colloquy. I think our time is coming close to expiring, so I yield the remainder of our time to you, and I ask unanimous consent Senator FRANKEN be allowed as much time as he needs to conclude. This has been a wonderful opportunity for me.

The PRESIDING OFFICER. Without objection, it is so ordered.

Mr. FRANKEN. Mr. President, I thank Senator WHITEHOUSE for his leadership. Algal—by the way, algal is the pronunciation of this. Algal energy is amazing. We are fueling jet fighters with jet fuel made from algae.

Both the President and Energy Secretary Chu have said we are in America's Sputnik moment. They are absolutely right. Fifty years ago we were in a global space race. Today we are in a global clean energy race. Whichever country takes the most action today to develop and make clean energy technologies will dominate the global economy in this century.

That means supporting financing for clean energy and energy efficiency projects. It means tax credits for clean energy manufacturing, providing incentives for retrofitting residential and public and commercial buildings. It means supporting basic research and keeping alive initiatives that support clean energy technology innovation. These need to be our priorities as we make energy policy and budget decisions.

We can pay for these investments by cutting expensive, outdated subsidies for oil companies that are making record profits. There is a lot more to be done if we are going to win this global clean energy race, but it is not going to be easy. It means unifying as a country and starting to do things differently than we have been doing them.

Albert Einstein said:

> We can't solve problems by using the same kind of thinking we used when we created them.

I am convinced we can win this race. No other country is better positioned. But first people need to understand the stakes. Climate change is real, and failure to address it is bad for our standing in the global economy, bad for the Federal budget, and bad for our national security. We can do better than that for our children and our grandchildren and posterity.

Mr. President, I thank Senator WHITEHOUSE and I yield the floor.

I suggest the absence of a quorum.

Mr. CARPER. Will the Senator withhold?

Mr. FRANKEN. I take that back.

The PRESIDING OFFICER. The Senator from Delaware.

BOILER MACT

Mr. CARPER. Mr. President, there is not the absence of a quorum, but I appreciate my colleague mentioning that. I said to him earlier today, maybe yesterday, Senator FRANKEN is a joy to have around here. Some of us know he brings a real special touch for trying to infuse some civility into this place again. He came up a year or two ago with the idea of a secret Santa exchange. We actually did it this year. I was not going to mention it tonight. My secret Santa turned out to be the Senator from Alaska, Senator MURKOWSKI, the colleague of the Presiding Officer. She gave me a most wonderful handmade gift that she and her staff created.

Delaware is the only State that doesn't have a national park. What they did is they created, on a sheet of paper like this—only it was a firm sheet of paper, not a regular sheet of paper, but they literally—this was the State of Delaware and they created a national park so we have a pop-up national park with a bus going around and our pictures riding along in the bus. I don't care what else I get for Christmas, that is going to be the best Christmas present for this year. I don't see how anybody tops that.

But that provides not only some civility but also some levity in a place that could use both, so I thank the Senator for all his contributions, but especially that one.

On something more serious. What I want to do is talk about the regulation EPA has been working on for a while. It is called the boiler MACT. The idea is maximum achievable technology here. If you go back in time, go back to about 1990—in 1970, in this country, Congress passed and the President signed—Richard Nixon actually signed—the Clean Air Act of 1970, a Republican President who had a Republican head of EPA. That was able to be implemented at the time we had the Cuyahoga River up in Cleveland, OH, that actually was on fire. There were lots of terrible things happening in our environment in this country.

Better things started to happen, not just cleaner water, wastewater treatment, and cleaner air, but it led in 1990 to the passage of the Clean Air Act Amendments of 1990. One of the requirements of the Clean Air Act Amendments of 1990 was in that legislation the Congress directed EPA to finalize regulations to reduce what are called air toxics from boilers by the year 2000. So the Clean Air Act was adopted in 1970. In 1990, 20 years later, the Clean Air Act Amendments were adopted, and in the Clean Air Act Amendments of 1990 Congress said: EPA, we want you to finalize regulations to reduce air toxics from boilers by the year 2000, 10 years.

The year 2000 came and went without any action. The Bush administration, George W. Bush administration, finalized a rule. I think it was in the year 2004. But they excluded many industrial boilers from having to comply. As it turned out, there are a lot of boilers in this country. I was stunned to find out there are about a half million boilers in this country. A lot of them are fairly small—schools or churches or smaller buildings, hospitals. But a bunch of them are pretty good size.

In any event, the Bush administration in the year 2004 came up with a rule, proposed a rule, but they excluded many industrial boilers from having to comply. In fact, the rule may not have been just proposed, it might actually have been finalized.

But, as a result, the regulation was vacated in 2007, 3 years later, by the Circuit Court of Appeals right here in the District of Columbia. So, 2004, EPA